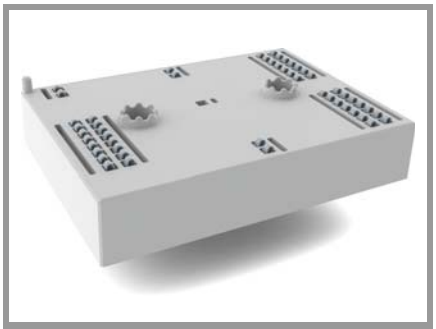
# SKiiP 38GB17E4V1



**MiniSKiiP® 3 Dual**

Half-Bridge

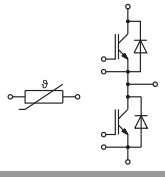
**SKiiP 38GB17E4V1**

### Features*

- Trench IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532
- NTC T-Sensor

### Remarks

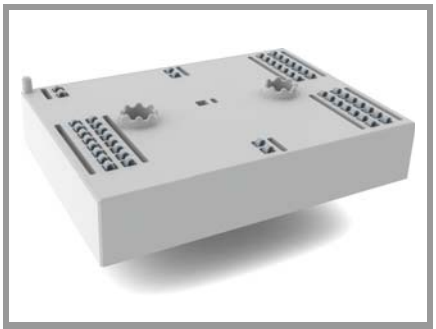
- Max. case temperature limited to $T_C$=125°C
- Product reliability results valid for $T_j$≤150°C (recommended $T_{j,op}$=-40...+150°C)



**GB**

| Absolute Maximum Ratings | | | | |
|---|---|---|---|---|
| **Symbol** | **Conditions** | | **Values** | **Unit** |
| **Inverter - IGBT** | | | | |
| $V_{CES}$ | $T_j$ = 25 °C | | 1700 | V |
| $I_C$ | $T_j$ = 175 °C | $T_s$ = 25 °C | 341 | A |
| | | $T_s$ = 70 °C | 277 | A |
| $I_{Cnom}$ | | | 300 | A |
| $I_{CRM}$ | | | 900 | A |
| $V_{GES}$ | | | -20 ... 20 | V |
| $t_{psc}$ | $V_{CC}$ = 1000 V<br>$V_{GE}$ ≤ 15 V<br>$V_{CES}$ ≤ 1700 V | $T_j$ = 150 °C | 10 | µs |
| $T_j$ | | | -40 ... 175 | °C |
| **Inverse - Diode** | | | | |
| $I_F$ | $T_j$ = 175 °C | $T_s$ = 25 °C | 267 | A |
| | | $T_s$ = 70 °C | 209 | A |
| $I_{FRM}$ | | | 600 | A |
| $I_{FSM}$ | 10 ms, sin 180°, $T_j$ = 150 °C | | 1566 | A |
| $T_j$ | | | -40 ... 175 | °C |
| **Module** | | | | |
| $I_{t(RMS)}$ | $T_{terminal}$ = 80 °C, 20 A per spring | | 280 | A |
| $T_{stg}$ | module without TIM | | -40 ... 125 | °C |
| $V_{isol}$ | AC sinus 50 Hz, t = 1 min | | 2500 | V |

| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| **Inverter - IGBT** | | | | | | |
| $V_{CE(sat)}$ | $I_C$ = 300 A<br>$V_{GE}$ = 15 V<br>chiplevel | $T_j$ = 25 °C | | 1.90 | 2.20 | V |
| | | $T_j$ = 150 °C | | 2.30 | 2.60 | V |
| $V_{CE0}$ | chiplevel | $T_j$ = 25 °C | | 0.80 | 0.90 | V |
| | | $T_j$ = 150 °C | | 0.70 | 0.80 | V |
| $r_{CE}$ | $V_{GE}$ = 15 V<br>chiplevel | $T_j$ = 25 °C | | 3.7 | 4.3 | mΩ |
| | | $T_j$ = 150 °C | | 5.3 | 6.0 | mΩ |
| $V_{GE(th)}$ | $V_{GE}$ = $V_{CE}$, $I_C$ = 12 mA | | 5.2 | 5.8 | 6.4 | V |
| $I_{CES}$ | $V_{GE}$ = 0 V | $T_j$ = 25 °C | | | 0.3 | mA |
| | $V_{CE}$ = 1700 V | | | - | | mA |
| $C_{ies}$ | $V_{CE}$ = 25 V<br>$V_{GE}$ = 0 V | f = 1 MHz | | 27.20 | | nF |
| $C_{oes}$ | | f = 1 MHz | | 1.06 | | nF |
| $C_{res}$ | | f = 1 MHz | | 0.88 | | nF |
| $Q_G$ | - 8 V...+ 15 V | | | 2400 | | nC |
| $R_{Gint}$ | $T_j$ = 25 °C | | | 2.1 | | Ω |
| $t_{d(on)}$ | $V_{CC}$ = 900 V<br>$I_C$ = 300 A<br>$R_{G\ on}$ = 2 Ω<br>$R_{G\ off}$ = 2 Ω<br>$di/dt_{on}$ = 7900 A/µs<br>$di/dt_{off}$ = 2025 A/µs<br>dv/dt = 5084 V/µs<br>$V_{GE}$ = +15/-15 V<br>$L_s$ = 25 nH | | | 216 | | ns |
| $t_r$ | | | | 52 | | ns |
| $E_{on}$ | | | | 47 | | mJ |
| $t_{d(off)}$ | | | | 697 | | ns |
| $t_f$ | | | | 167 | | ns |
| $E_{off}$ | | | | 102 | | mJ |
| $R_{th(j-s)}$ | per IGBT, $\lambda_{paste}$=0.8 W/(K*m) | | | 0.15 | | K/W |



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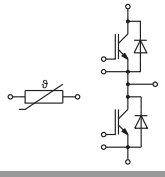
| Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Conditions** | | **min.** | **typ.** | **max.** | **Unit** |
| **Inverse - Diode** | | | | | | |
| $V_F = V_{EC}$ | $I_F$ = 300 A<br>$V_{GE}$ = 0 V<br>chiplevel | $T_j$ = 25 °C | | 2.00 | 2.40 | V |
| | | $T_j$ = 150 °C | | 2.15 | 2.57 | V |
| $V_{F0}$ | chiplevel | $T_j$ = 25 °C | | 1.32 | 1.56 | V |
| | | $T_j$ = 150 °C | | 1.08 | 1.22 | V |
| $r_F$ | chiplevel | $T_j$ = 25 °C | | 2.3 | 2.8 | mΩ |
| | | $T_j$ = 150 °C | | 3.6 | 4.5 | mΩ |
| $I_{RRM}$ | $I_F$ = 300 A<br>$di/dt_{off}$ = 8569 A/µs<br>$V_{GE}$ = -15 V<br>$V_{CC}$ = 900 V | | | 517 | | A |
| $Q_{rr}$ | | | | 100 | | µC |
| $E_{rr}$ | | | | 69 | | mJ |
| $R_{th(j-s)}$ | per Diode, $\lambda_{paste}$=0.8 W/(K*m) | | | 0.24 | | K/W |
| **Module** | | | | | | |
| $L_{CE}$ | | | | 15 | | nH |
| $M_s$ | to heat sink | | 2 | | 2.5 | Nm |
| w | | | | 76 | | g |
| **Temperature Sensor** | | | | | | |
| $R_{100}$ | $T_c$=100°C ($R_{25}$=5 kΩ) | | | 493 ± 5% | | Ω |
| $B_{25/85}$ | $R_{(T)}=R_{25}*\exp[B_{25/85}*(1/T-1/298)]$, T[K] | | | 3420 | | K |



GB

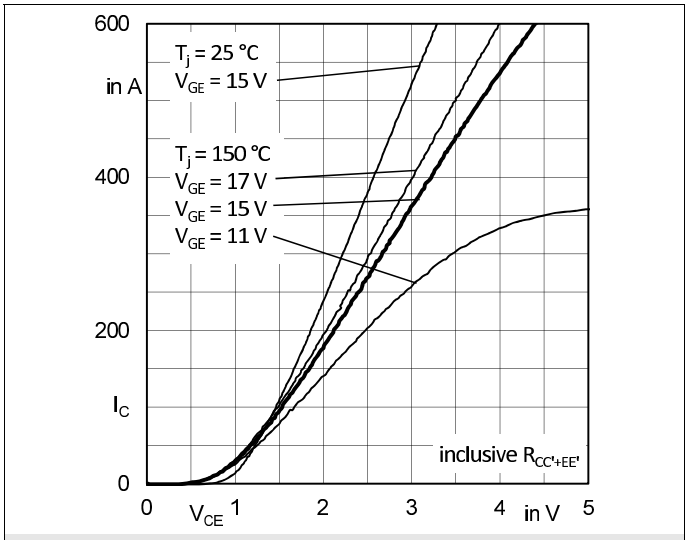



Fig. 1: Typ. output characteristic

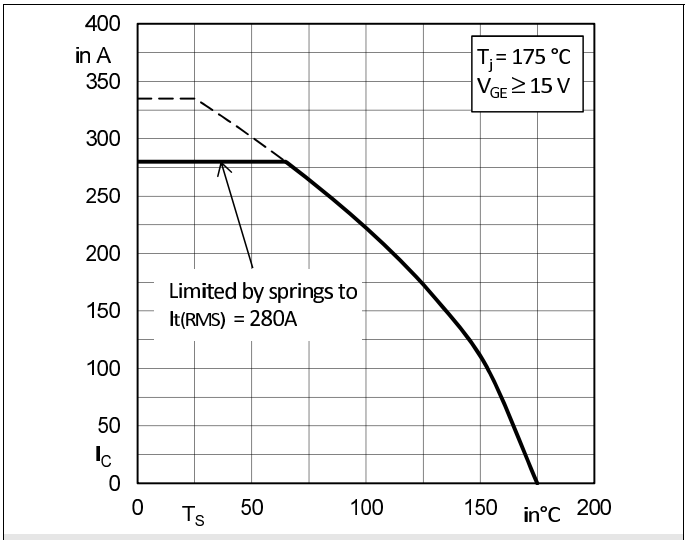



Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

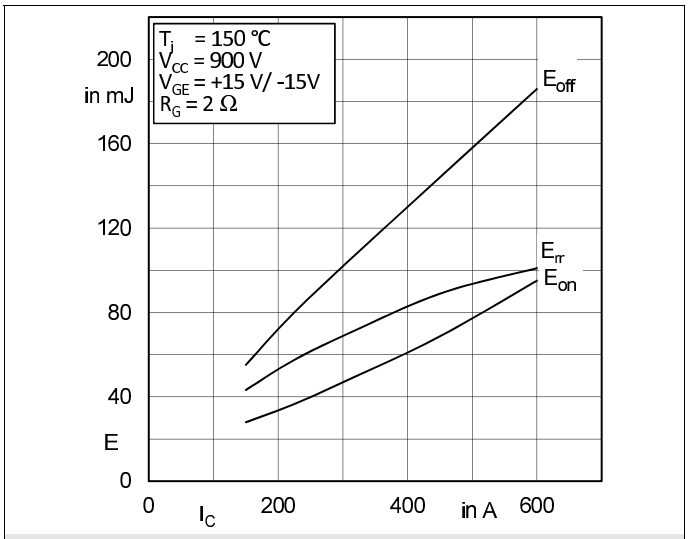



Fig. 3: Typ. turn-on /-off energy = f ($I_C$)

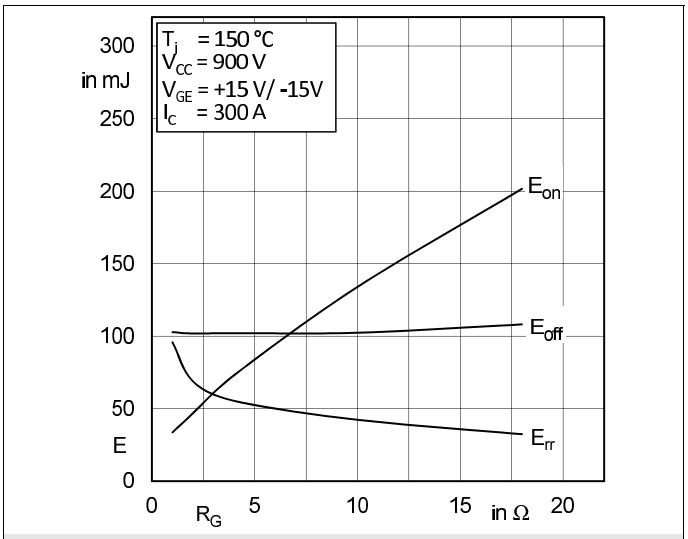



Fig. 4: Typ. turn-on /-off energy = f ($R_G$)

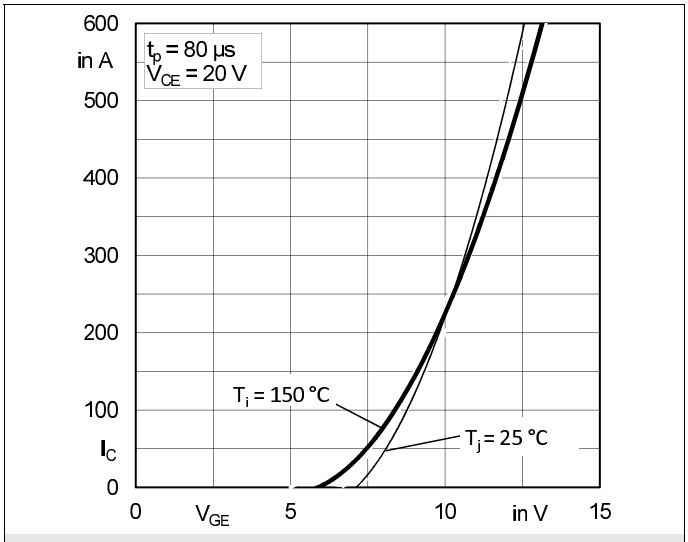



Fig. 5: Typ. transfer characteristic

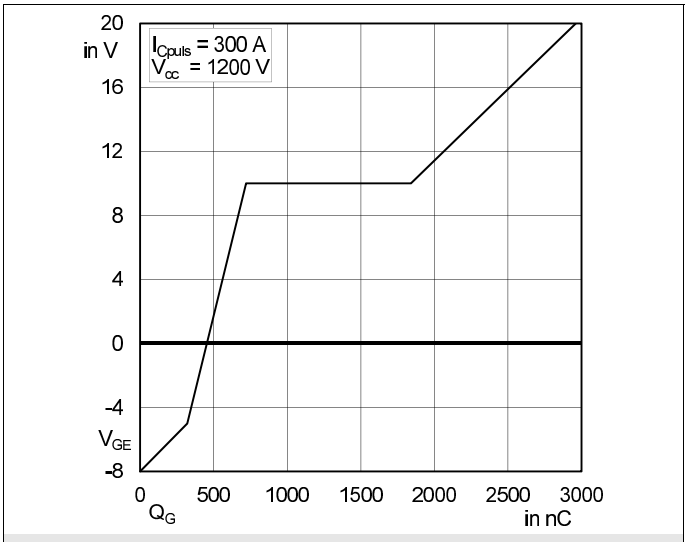



Fig. 6: Typ. gate charge characteristic

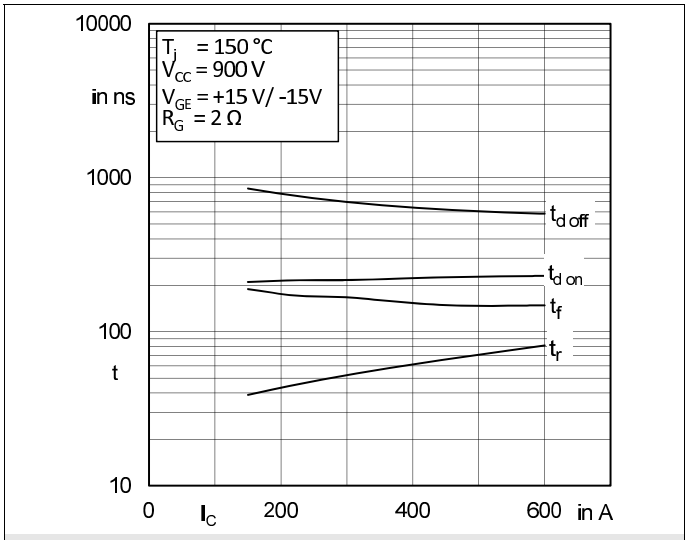



Fig. 7: Typ. switching times vs. $I_C$

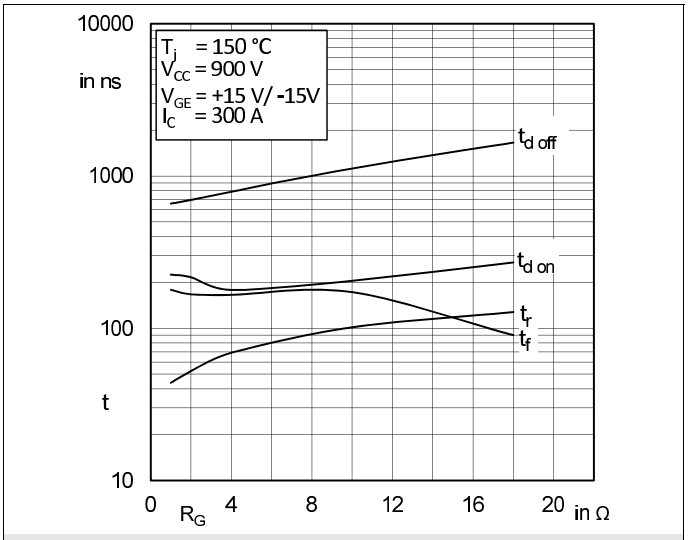



Fig. 8: Typ. switching times vs. gate resistor $R_G$

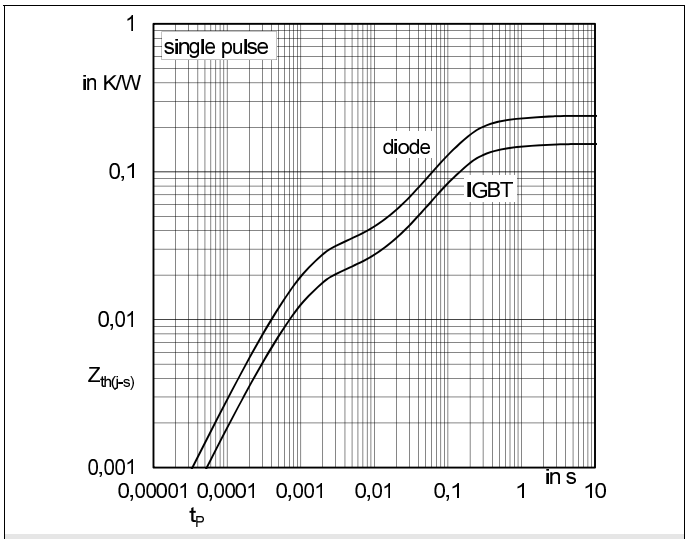



Fig. 9: Typ. transient thermal impedance

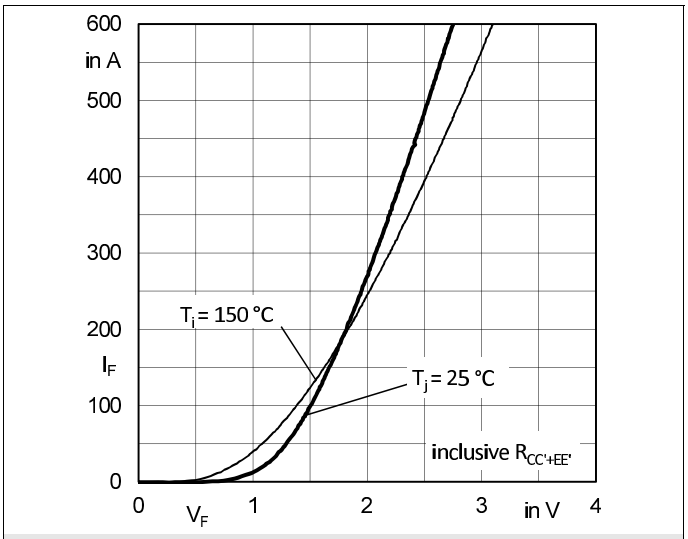



Fig. 10: Typ. CAL diode forward characteristic

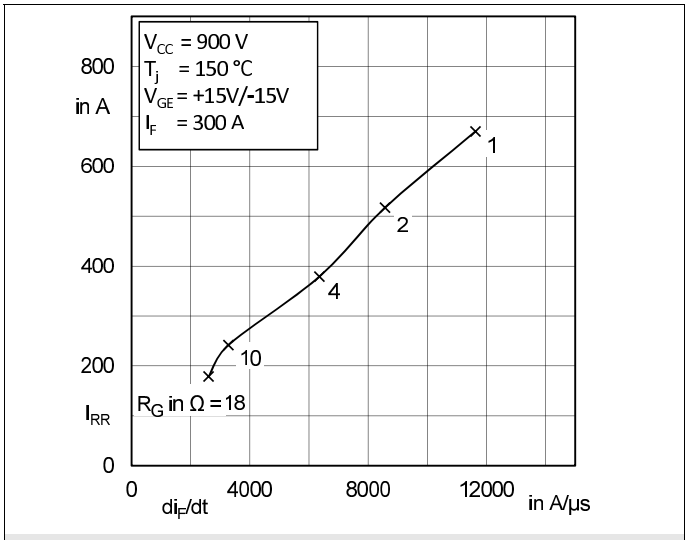



Fig. 11: Typ. CAL diode peak reverse recovery current

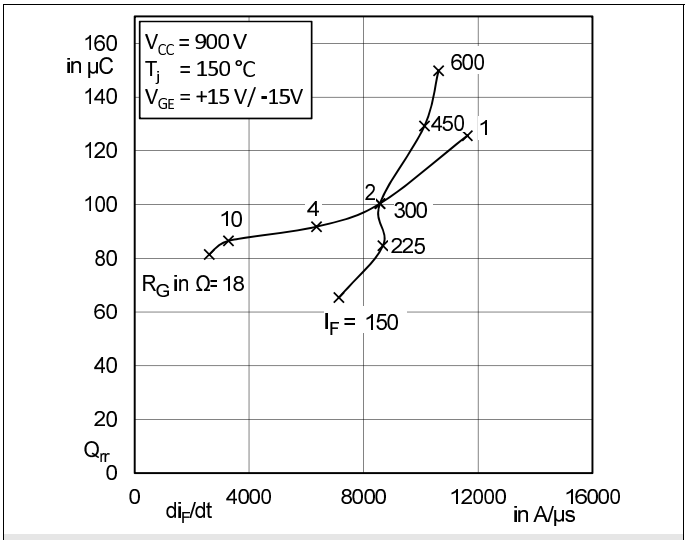
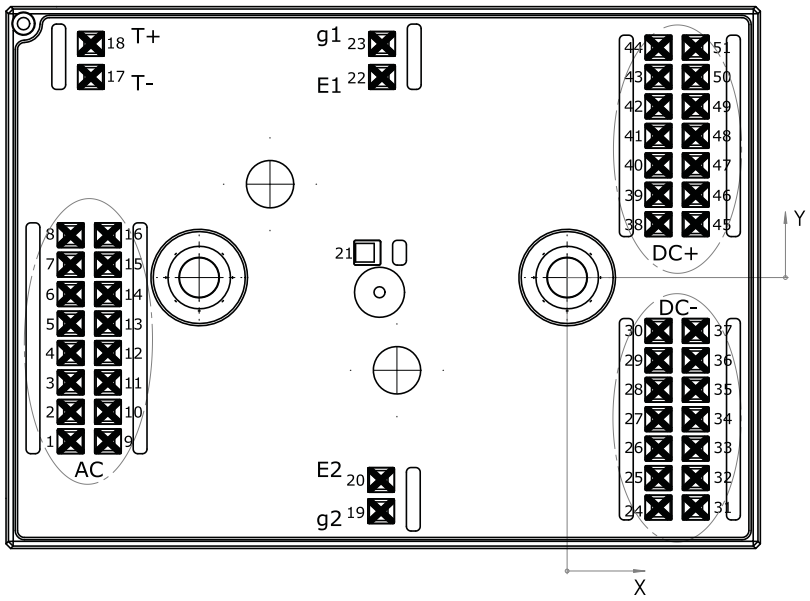



Fig. 12: Typ. CAL diode recovery charge

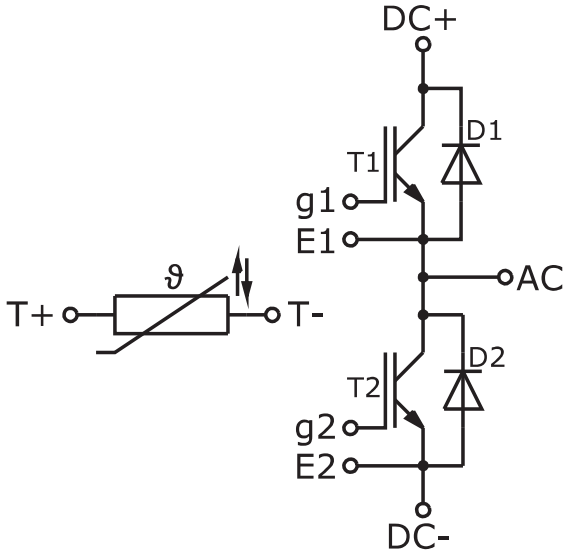
 

| Pin out | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Pin* | *X* | *Y* | *Function* | *Pin* | *X* | *Y* | *Function* | *Pin* | *X* | *Y* | *Function* |
| 1 | -53,98 | -17,80 | AC | 18 | -51,78 | 25,40 | T+ | 35 | 13,98 | -12,20 | DC- |
| 2 | -53,98 | -14,60 | AC | 19 | -20,23 | -25,40 | g2 | 36 | 13,98 | -9,00 | DC- |
| 3 | -53,98 | -11,40 | AC | 20 | -20,23 | -22,00 | E2 | 37 | 13,98 | -5,80 | DC- |
| 4 | -53,98 | -8,20 | AC | 21 | -21,73 | 2,70 | | 38 | 9,93 | 5,80 | DC+ |
| 5 | -53,98 | -5,00 | AC | 22 | -20,13 | 21,80 | E1 | 39 | 9,93 | 9,00 | DC+ |
| 6 | -53,98 | -1,80 | AC | 23 | -20,13 | 25,40 | g1 | 40 | 9,93 | 12,20 | DC+ |
| 7 | -53,98 | 1,40 | AC | 24 | 9,93 | -25,00 | DC- | 41 | 9,93 | 15,40 | DC+ |
| 8 | -53,98 | 4,60 | AC | 25 | 9,93 | -21,80 | DC- | 42 | 9,93 | 18,60 | DC+ |
| 9 | -49,93 | -17,80 | AC | 26 | 9,93 | -18,60 | DC- | 43 | 9,93 | 21,80 | DC+ |
| 10 | -49,93 | -14,60 | AC | 27 | 9,93 | -15,40 | DC- | 44 | 9,93 | 25,00 | DC+ |
| 11 | -49,93 | -11,40 | AC | 28 | 9,93 | -12,20 | DC- | 45 | 13,98 | 5,80 | DC+ |
| 12 | -49,93 | -8,20 | AC | 29 | 9,93 | -9,00 | DC- | 46 | 13,98 | 9,00 | DC+ |
| 13 | -49,93 | -5,00 | AC | 30 | 9,93 | -5,80 | DC- | 47 | 13,98 | 12,20 | DC+ |
| 14 | -49,93 | -1,80 | AC | 31 | 13,98 | -25,00 | DC- | 48 | 13,98 | 15,40 | DC+ |
| 15 | -49,93 | 1,40 | AC | 32 | 13,98 | -21,80 | DC- | 49 | 13,98 | 18,60 | DC+ |
| 16 | -49,93 | 4,60 | AC | 33 | 13,98 | -18,60 | DC- | 50 | 13,98 | 21,80 | DC+ |
| 17 | -51,78 | 21,80 | T- | 34 | 13,98 | -15,40 | DC- | 51 | 13,98 | 25,00 | DC+ |

all values in [mm]




**Pinout and Dimensions**




**Pinout**

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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